# CLAIMS

1. A surface acoustic wave resonator comprising:

a piezoelectric substrate;

an inter-digital transducer formed of a plurality of electrode fingers disposed on a surface of the piezoelectric substrate; and

reflectors disposed near opposite ends of the inter-digital transducer,

wherein

the inter-digital transducer has a gradation region where an electrode finger pitch of the plurality of electrode fingers at the opposite ends is different from an electrode finger pitch near a center of the inter-digital transducer,

regarding the electrode finger pitches in the gradation region, the electrode finger pitch of the electrode fingers at the farthest end, which is one end of the gradation region and an end of the inter-digital transducer, is set to be 1 through 5 % smaller than the electrode finger pitch near the center of the inter-digital transducer, and

the electrode finger pitches are sequentially varied to gradually approach the electrode finger pitch near the center of the inter-digital transducer, in the range from the electrode finger at the farthest end to the electrode finger lying at the other end of the gradation region and on the center side of the inter-digital transducer.

2. The surface acoustic wave resonator of claim 1,

wherein the number of the electrode fingers in the gradation region is set dependently on a set value of the electrode finger pitch of the electrode fingers at the farthest end that is one end of the gradation region.

3. The surface acoustic wave resonator of claim 2,

wherein the number of the electrode fingers in the gradation region is set at 5 through 30.

4. A ladder-type surface acoustic wave filter comprising:

a piezoelectric substrate; and

series resonators and parallel resonators that are interconnected on the surface of the piezoelectric substrate,

wherein the surface acoustic wave resonator of claim 1 is used as one or more of the series resonators.

5. A ladder-type surface acoustic wave filter comprising:

a piezoelectric substrate; and

series resonators and parallel resonators that are interconnected on the surface of the piezoelectric substrate,

wherein the surface acoustic wave resonator of claim 1 is used as one or more of the series resonators and one or more of the parallel resonators.

6. A surface acoustic wave filter comprising:

a piezoelectric substrate;

a plurality of inter-digital transducers disposed closely on an identical surface acoustic wave propagation path on the piezoelectric substrate; and

reflectors disposed on opposite ends of the structure having the plurality of inter-digital transducers,

wherein

at least one of the plurality of inter-digital transducers is a first inter-digital transducer connected to a signal path in series, and at least one of the plurality of inter-digital transducers is a second inter-digital transducer connected between the signal path and a ground,

the first inter-digital transducer is formed of a plurality of

electrode fingers, and has a gradation region where an electrode finger pitch of the plurality of electrode fingers at opposite ends is different from an electrode finger pitch near a center of the first inter-digital transducer,

regarding the electrode finger pitches in the gradation region, the electrode finger pitch of the electrode fingers at the farthest end, which is one end of the gradation region and an end of the first inter-digital transducer, is set to be 1 through 5 % smaller than the electrode finger pitch near the center of the first inter-digital transducer, and

the electrode finger pitches are sequentially varied to gradually approach the electrode finger pitch near the center of the first inter-digital transducer, in the range from the electrode finger at the farthest end to the electrode finger lying at the other end of the gradation region and on the center side of the first inter-digital transducer.

7. The surface acoustic wave filter of claim 6, wherein

the second inter-digital transducer is formed of a plurality of electrode fingers, and has a gradation region where an electrode finger pitch of the plurality of electrode fingers at opposite ends is different from an electrode finger pitch near a center of the second inter-digital transducer,

regarding the electrode finger pitches in the gradation region, the electrode finger pitch of the electrode fingers at the farthest end, which is one end of the gradation region and an end of the second inter-digital transducer, is set to be 1 through 5 % smaller than the electrode finger pitch near the center of the second inter-digital transducer, and

the electrode finger pitches are sequentially varied to gradually approach the electrode finger pitch near the center of the second inter-digital transducer, in the range from the electrode finger at the farthest end to the electrode finger lying at the other end of the gradation region and on the center side of the second inter-digital transducer.